Kurze Originalmitteilungen

Strontium Uptake in Shell Aragonite from a Freshwater Gastropod

in Tank Experiments and in a Natural Environment (Lake Constance)

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In tank growth experiments Buchardt and Fritz [1] determined strontium uptake in the aragonite shell from the freshwater gastropod *Lymnaea stagnalis* with variable Sr/Ca ratios and at different temperatures. Within the limits defined by natural freshwater environments, the Sr/Ca ratio in the aragonite was found to be linearly related to the Sr/Ca ratio in the water by a distribution coefficient $k^{A}_{Sr} = 0.237 \pm 0.029$ which remained unaffected by variations in temperature and growth rate.

This coefficient is identical with the distribution coefficient earlier found [2, 3] in (naturally grown) shells of *Lymnaea sp.* from Lake Constance ($k^{A}_{Sr} = 0.0238$) and very similar to the coefficients in the shells of other gastropod genera from the same lake (Table 1).

Recent carbonate sediments from Lake Constance are strongly enriched in Sr as compared with other 'normal' freshwater environments. The unusually high Sr/Ca ratios in the inorganic precipitates and in the organic shell carbonates [2–4] can be attributed to the very high $Sr \times 1000/Ca$ ratio (6 ± 0.5) of the water of Lake Constance which is only about one-third less than that of seawater. These findings led to the conclusion that Sr contents and Sr/Ca ratios of inorganic and organic carbonates are not necessarily indicators of salinity but of the Sr/Ca ratio in the depositional aquatic environment. The experimental work of Buchardt and Fritz fully confirms this statement.

Whether the distribution coefficient found in *Lymnaea* can be transferred to other limnic molluscs is still an open question: Our findings in Lake Constance (Table 1) seem to indicate that the distribution coefficient is generally higher in aragonitic pelecypod shells than in aragonitic gastropod shells within the same environment; the standard deviation varies considerably within one genus: it is much higher for *Pisidium* than for *Anodonta*. The *Anodonta* shells studied comprise only one species (*A. cygnaea*) whereas the *Pisidium* shells stem from five different species (*P. amnicum, P. nitidum, P. subtruncatum, P. casertanum,* and *P. henslowanum*).

Further investigations, both in nature and in the laboratory, seem therefore necessary in order to study the influence of taxonomy on the effective partitioning of strontium.

Table 1. Distribution coefficients (k^{A}_{Sr}) in aragonitic shells of different gastropods and pelecypods of Lake Constance. Data after [2] except for 9 of the 12 values for *Anodonta* [5]

	Genus	Samples analyzed	Distribution coefficient			Average
			min.	∅	max.	
Gastropods	*Lymnaea*	5	0.225	0.238	0.260	0.252
	Planorbis	4	0.185	0.258	0.350	
	Bithynia	4	0.261	0.282	0.303	
	Valvata	2	0.203	0.233	0.263	
Pelecypods	*Anodonta*	12	0.253	0.307	0.418	0.348
	Sphaerium	3	0.332	0.360	0.387	
	Pisidium	9	0.228	0.378	0.563	

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A Remark on Phototropy in Glasses

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We recently measured [1] the kinetics of the blackening of phototropic glass in the light and its bleaching in the dark. During both processes the bleaching constant was $(0.161 \pm 0.027)\ min^{-1}$ with simultaneous illumination and $(0.125 \pm 0.11)\ min^{-1}$ in the dark, independent of temperature and initial transmission. The glass used was of the type Photosolar from Rodenstock (Munich). It would have been interesting to know whether other types of glass would have shown different values, i.e., if the average lifetime of the extinction centers depends on the preparation of the glass (ingredients, annealing).

The Jenaer Optische Werke [2] published two curves taken with their phototropic glasses Heliovar Color and Heliovar II. The evaluation of these curves according to our kinetics revealed for the bleaching constant with simultaneous illumination $(0.167 \pm 0.04)\ min^{-1}$ and $(0.128 \pm 0.05)\ min^{-1}$ in total darkness.

The equality of the values in the dark and the equality of the values with presumably different light intensities prove that only *one* kind of black center is formed in different phototropic glasses.

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2. Jenaer Rundschau, Messe-Sonderbeilage 1978, p. 5, Fig. 2

